

(Example 5,6), 3.7 (Example 3, 4), 0.037 (Example 1, 2) parts by volume, and claim 1. No new matter was added. Accordingly, claims 2-8 are pending in this application, with claims 2-3 and 8 pending for the Examiner's reconsideration, with claims 4 and 8 being independent.

Reexamination and reconsideration in light of the above amendments and the following remarks is respectfully requested.

Rejections under 35 U.S.C. §112

Claim 8 is rejected under 35 U.S.C. §112, second paragraph for indefiniteness. By this amendment, claim 8 was amended to recite that the amount of resin is approximately 0.03-9.3 parts by volume with respect to 100 parts by volume of said conductive fine particles. This eliminates the potential confusion that a resin be present but the quantity is none. Withdrawal of this rejection is respectfully requested.

Rejections under 35 U.S.C. §103

Claims 1-3 are rejected under 35 U.S.C. §103(a) as being unpatentable over JP 10258486 to Kimura in view U.S. Patent No. 5,662,962 to Kawata et al. Applicant respectfully traverses this rejection.

However, in order to expedite prosecution, by this amendment claim 1 was canceled, and claims 2-3 were amended to depend from claim 8, mooted this rejection. Withdrawal of this rejection is respectfully requested.

The Examiner at paragraph 22 states that the calculation of the amount of binder resin is moot in view of the new ground of rejection. Applicant disagrees. The Office Action does not contradict or rebut Applicants earlier assertions that the examiner's calculations to justify this rejection are in error. Accordingly, the corrected calculated volume of the resin remains un rebutted, and therefore accepted as correct as previously asserted, and is repeated below:

Kimura '486 discloses in paragraph [0007] that ink composition containing ITO is:

ITO fine powder of 10-30 wt%,
Binder resin of 1-6 wt%, and
Solvent and the like of 64-89 wt%.

Kimura '486 also discloses in Example in paragraph [0010] that ITO ink composition is:

ITO fine powder of 17 wt%,

Binder (polyester resin) of 3 wt%, and

Solvent (cyclohexanone as main component) of 80 wt%.

In Kimura '486, binder resin is used at least 3.3 parts by weight with respect to 100 parts by weight of ITO fine powder according to paragraph [0007]. This corresponds to binder resin at least 16.4 parts by volume with respect to 100 parts by volume of ITO fine powder, as represented by volume. Since specific gravity of ITO is in a range of 6.9-7.1, and specific gravity of binder resin is in a range of 1.2-1.4, using 6.9 as the specific gravity of ITO and 1.4 as the specific gravity of the binder resin results in a possible minimum volume value of binder resin with respect to maximum volume of ITO.

The result is that the amount of Kimura's resin is at least 16.4 parts by volume. The result is that the amount of Kimura's resin is at least 16.4 parts by volume with respect to 100 parts by volume of the conductive fine particles. Therefore, the amount of resin in amended claim 8, 0.03-9.3 parts per volume with respect to 100 parts by volume of the conductive fine particles is not disclosed, taught or suggested by Kimura '486.

Still further, while Kimura '486 teaches a possible minimum amount (16.4 parts by volume) of binder resin, there does not appear to be sufficient foundation or experimental justification of an amount as small as 16.4 parts by volume. Kimura '486 discloses using no less than 87.0 parts by volume, corresponding to 3 weight per cent of resin in the examples at column 4, paragraph [0010].

In contrast, the present specification explains that too large amount, over 73 parts by volume, of resin does not ensure the conductivity among the conductive fine particles "because the contact between the conductive fine particles is inhibited by the insulating resin and, if the amount of resin is too large, the fine particles do not contact with each other, so that the movement of electrons among the fine particles is inhibited." See page 15, lines 3-7. Accordingly, it is doubtful that Kimura '486 can obtain a transparent electroconductive film with excellent conductivity as the present claimed invention.

Applicant further disagrees with the discussion of Kimura '486 in the Office Action at paragraph 22. Although the polyethylene terephthalate has a melting point between 243-260°C, "the temperature of 130°C may be a limit in the case of polyethylene terephthalate (PET) film. Specification at page 4, lines 22-23. Further, when "subjected to ... a high temperature of 150 to 180°C, ... the resin film will be deformed at such a high temperature." See page 5, lines 19-22. If Kimura's conductive film using PET as a base film is subjected to such a high temperature of 150 to 180°C, the base film is deformed even though the temperature is under the melting point of 243-260°C. Especially in continuous application method from delivering roller 1 to winding roller 9 depicted in Kimura '486 at Fig. 1, a tension is exerted to the film. When the tensed film is subjected to a temperature of 150 to 180°C, a significant deformation is caused to the base film.

For all the reasons discussed above, there is no motivation to over coat the transparent conductive film of Kimura '486 with the silica sol of Kawata et al. '962.

Claim 8 is rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,662,962 to Kawata et al. Applicant respectfully traverses this rejection.

Claim 8 recites a transparent conductive film comprising: a compressed layer on a support, said compressed layer having conductive fine particles and a resin, said resin being approximately 0.03-9.3 parts by volume with respect to 100 parts by volume of said conductive fine particles, said compressed layer formed by compressing the conductive fine particles and the resin on the support, wherein said compressed layer further comprises an impregnated transparent substance.

Kawata et al. '962 teaches "a method for forming a transparent, electroconductive substrate, in which transparent, electroconductive ink ... is coated and dried on a support ... to thereby form thereon a transparent, electroconductive film ..., and thereafter an overcoating sol solution ... is coated on said transparent electroconductive film and then dried or dried and baked." See column 15, lines 29-39. Still further, "a method for forming a transparent, electroconductive substrate, in which a transparent, electroconductive ink ... is coated ... and then dried and baked to thereby form a transparent, electroconductive film on the support, and

thereafter an overcoating sol solution ... is coated on said transparent electroconductive film and then dried or dried and baked.” See column 16, lines 30-40. Thus, the method of Kawata et al. ‘962 comprises a baking process. This baking process promotes “the sintering of the contact area between the electroconductive, ultra-fine particles” (column 5, lines 29-30) in order to “lower the resistance of the electroconductive film”, see column 5, lines 33-34. This baking process is operated at about 400°C or higher (column 5, lines 28-29) in air and then 400°C to 600°C in an inert gas atmosphere. See column 5, lines 31-32.

In contrast, the present invention comprises a compressing process for obtaining conductive property. In the compressing process, the compression increases the number of contact points among the conductive fine particles to increase the contact area and the electric resistance is reduced. See page 22, line 25 to page 23, line 3. Accordingly, the electric resistance is reduced without calcining at a high temperature. See page 9, lines 7-8. The present specification clearly recites the unfavorable influence of the calcining process at page 4, lines 17-21, whereby “since a calcining step at a temperature higher than 300°C must be carried out, it is difficult to form a conductive film on a support such as a resin film. In other words, the resin film will be melted, carbonized, or burnt by the high temperature.”

Not calcining at a high temperature permits the support to be “various ones such as resin film, glass, ceramics and others.” See page 19, lines 7-8. Furthermore, the use of resin film results in weight reduction (page 19, line 17) and good close adhesion of the conductive fine particle layer to the film. See page 19, lines 15-16. The peel test result in the Example to evaluate the close adhesion of the conductive layer to the support film and the strength of the conductive layer reflects this remarkable effect. Additionally, the use of the resin film brings excellent flexibility of the transparent conductive film.

Accordingly, for all the reasons discussed above, it would not be obvious to make the transparent conductive film of claim 8 by coating the porous ITO layer with the silica or silica sol material of Kawata et al. ‘962. Withdrawal of this rejection is respectfully requested.

Dependent claims 2-3 depend from claim 8, are also allowable for the reasons above. Moreover, these claims are further distinguished by the materials recited therein, particularly within the claimed combination. Withdrawal of the §103(a) rejection is therefore respectfully solicited.

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Conclusion

For the foregoing reasons, claims 2-3 and 8 are allowable, and the present application is in condition for allowance. Accordingly, favorable reexamination and reconsideration of the application in light of these amendments and remarks is courteously solicited. If the examiner has any comments or suggestions that would place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the number below.

Respectfully submitted,



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Date: January 21, 2003

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Appendix I

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In accordance with 37 CFR 1.121(c)(1)(ii), amended claims 2, 3 and 8 are set forth in a marked-up version below:

2. (amended) The transparent conductive film according to claim [1]8, wherein said layer containing the conductive fine particles is formed by applying a dispersion liquid, which contains the conductive fine particles and the resin, onto the support and drying the liquid, said resin being contained at an amount of 73 parts by volume or less with respect to 100 parts by volume of said conductive fine particles in said dispersion liquid as represented by volume before dispersion.

3. (amended) The transparent conductive film according to claim [1]8, wherein said support is a film made of resin.

8. (amended) A transparent conductive film comprising:
a compressed layer on a support, said compressed layer having conductive fine particles and a resin, said resin being approximately 0.03-9.3 parts by volume with respect to 100 parts by volume of said conductive fine particles, said compressed layer formed by compressing the conductive fine particles and the resin on [a]the support,

[wherein said resin is 9.3 parts by volume or less with respect to 100 parts by volume of said conductive fine particles as represented by volume, and]

wherein said compressed layer [is]further comprises an impregnated [with a] transparent substance [after compression].